

Exploring the Tangible Conservation of Architectural Heritage and History: Bringing Past into the Future

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Abstract: Architecture is important in many facets of life and serves as historical documentation for the society and country. Many people have worked to promote the preservation of historical structures, particularly the preservation of the architectural style. Heritage can take on many different forms, including intangibles like memories, emotions, beliefs, and customs as well as tangible forms like sites, buildings, and landscapes. A significant artistic and cultural heritage is preserved in the religious and spiritual centers. The primary players in this heritage are only dimly aware of the value and significance of their cultural heritage in terms of history, culture, and civilization. This ignorance has resulted in improper upkeep and care for these structures. Threats to cultural heritage include rogue, unplanned modernization, and civic development that promotes tourism. Traditional architecture has been destroyed and restored or added to several heritage monuments using new materials without taking into account how well those materials work with the local climate. To bring the past into the future, it is now possible to capture and produce precise models of historical and archaeological sites thanks to recent advancements in three-dimensional (3-D) scanner technology and photogrammetric techniques. This allows you unlimited access to these locations, which is immensely advantageous from both a research and cultural standpoint. Virtual collections are formed in great numbers through the virtualization process. These collections are archives that have been monitored and restored as needed thanks to extensive indexing and visualization basis for the long-term protection of cultural assets presented in this essay. As modern documentation demands have recognized the potential of BIM in recent years, the article also intends

to illustrate the development and current state of the usage of Building Information Modelling (BIM) in the field of cultural heritage documentation. The study examines the necessity of maintaining sustainability in conservation efforts to preserve the region's priceless cultural heritage.

Keywords: *architectural history, heritage, building conservation, architectural preservation, sustainability*

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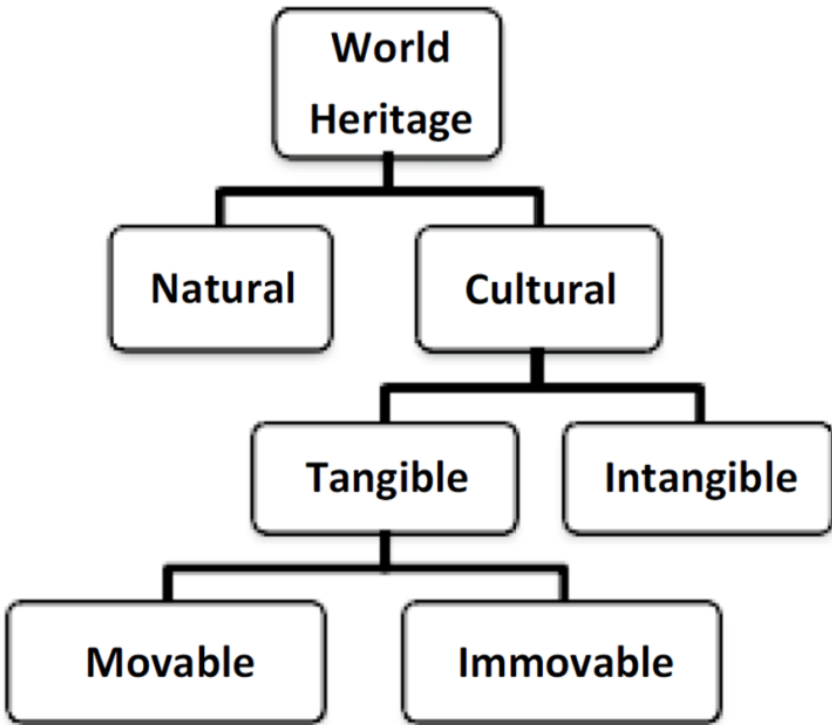
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1. Introduction

The term “cultural heritage” describes how modern culture uses the past. “Our cultural legacy” is a contemporary or postmodern reflection of the past and helps to shape national stereotypes and regional identities. Cultural heritage is a country's cultural treasure and is vital for understanding and promoting its history, science, and culture; as such, it must be preserved and conserved to promote national identity. Cultural heritage structures have a crucial role in preserving regional and societal identities as cultural resources [1]. Heritage often refers to a phenomenon that exists within a traditional historical narrative, but in recent years, it has increasingly expanded to include appearances from groups that are on the periphery of that traditional discourse. Cultural heritage, as a way of thinking and acting in everyday life, is the country's cultural wealth. For society, the nation, and the state to understand and develop history, science, and culture, it is essential [2,3,4]. To promote national culture and provide the maximum possible level of prosperity for the populace, it must be kept and managed effectively through protection, development, and exploitation [5,6].

Cultural heritage is described into two categories by the United Nations Educational, Scientific, and Cultural Organization (UNESCO): tangible heritage and intangible heritage (Figure 1). Immovable and mobile cultural relics are the two categories of tangible heritage. Historical structures, monuments, and archaeological sites are all considered to be immovable heritage [7].

Figure 1. Classification of the world heritage presented by the UNESCO



Globalization's effects have quickly transformed our cities. It's important to take a thoughtful approach to cultural heritage and conservation culture. Heritage awareness is an important component of conservation. One of the main reasons heritage is damaged is that the general public is not informed and is not involved in the conservation process [8]. This assortment of essays addresses heritage preservation, development, and administration from a variety of theoretical perspectives and academic fields. It incorporates viewpoints from social anthropology, history, human geography, archaeology, and heritage preservation. The texts provide examples from many contexts and locales to highlight various facets of culture and legacy.

Restoring a site's cultural history is one strategy to preserve it. The goal is to return cultural heritage sites to their original state from an archaeological, historical, and technical standpoint. Historic structures can be appreciated at all times, and cultural heritage structures have aesthetic, architectural, form, and spatial values, so restoration is crucial. Historical structures can serve as a legacy of a nation's history and culture by preserving its ideals for future generations.

The significance of historical structures, particularly heritage architecture, is now beginning to be reinforced through restoration methods thanks to cultural and symbolic value. Every site has contrasting stories associated with it that are rooted in history and linked to certain populations. Conflicts change the meaning in different ways, depending on which side prevails. A broader viewpoint has recently been incorporated into historic preservation. The significance it has for people is emphasized, and preservation is seen as a crucial component of societal advancement.

The field of cultural heritage documentation has seen a growth in BIM over the past ten years, setting the path for a future in the digitally built environment. BIM is seen as a disruptive force by many architects, archaeologists, conservationists, and engineers who believe it will alter how experts document and preserve historical monuments. A monument is a style of building built to honor a significant person or event. Due to its cultural significance or historical significance as an example of architecture, this event may have gained significance to a particular social group. Structures or buildings that are regarded as important examples of architectural and cultural heritage are frequently referred to as monuments. The subject of documenting cultural heritage has seen a growth in BIM over the past ten years, laying the path for a future in the digitally constructed environment. BIM is seen as a disruptive force by many architects, archaeologists, conservationists, and engineers who believe it will alter how experts document and preserve historical monuments. Researchers have recently created many methods for the trustworthy and organized handling of data on cultural heritage [9]. With the enormous advancements in computer science and its capabilities, the emergence of supercomputers that can operate with multiple processors simultaneously, the development of virtual reality, and the creation of visual and auditory display devices, virtual reality software can now imitate reality by creating and displaying a large number of sequential 3D images on screen and moving them quickly so that they appear to be scenes and move naturally.

1.1. Architectural Heritage

According to the “UNESCO 1972 World Heritage Convention,” cultural heritage monuments are defined as collections of structures and sites that have exceptional importance on a global scale from the perspectives of history, art, and science. According to contemporary restoration philosophy, the historical and aesthetic values of a cultural legacy are its distinguishing characteristics. A historical structure is a complex system of rooms, volumes, materials, surfaces, constructive elements, current, and former

uses and configurations, deterioration, etc. A continual historical process of alteration and transformation led to the final product. An architectural heritage can be thought of as an “artifact,” wherein its components bear evidence of the cultures and occasions that took place during the building's lifetime. Surveying and archival analysis are essential to the study of architectural heritage [10]. Therefore, all structures, groups of structures, and monuments are real estate whose artistic worth or historical significance has been acknowledged.

The correspondence structures are included in what is referred to as “architectural heritage”. Monuments are all notable historical, archaeological, artistic, scientific, social, or technical buildings and constructions, including their fixtures and fittings. Homogenous clusters of urban or rural structures notable for their historical, archaeological, aesthetic, scientific, social, or technical value and sufficiently coherent to define topographic units are included in groups of buildings.

Sites are regions that are partially built upon, sufficiently unique and homogenous to be topographically identifiable, and of noticeable historical, archaeological, aesthetic, scientific, social, or technological interest. They are the result of the joint activities of man and nature [11].

1.2. Architectural Conservation

It has been made an effort to comprehend and interpret the heritage to demonstrate how the world was before us about protecting the heritage so that it has an embodied reality for its interpretation [12]. Protection and upkeep are examples of conservation [13]. Conserving valuable structures or architectural values is referred to as architectural conservation. The preservation and restoration of architecture have been seen as a fundamental value ever since it first emerged. Damaged monuments were repaired in ancient Greece to preserve the structure's original form. There have been numerous techniques used in the past to repair structures (mainly religious structures) [14]. Before the late 1700s, conservation efforts for religious structures were typically motivated by religious convictions and, in some cases, on logical premises because maintenance and repair were less expensive than replacement and reconstruction [15].

The conservation of the architectural heritage was primarily concerned with a set of measures to eliminate the erosive factors, improve the physical condition of the architectural heritage, and in some cases, pay attention to its artistic, aesthetic, and symbolic aspects of them. This can be seen by studying the experiences regarding the conservation of the architectural

heritage carried out before the nineteenth century. The main goal of conservation was to take a series of steps to get rid of the things that degrade the architectural heritage's physical state. Perspectives on the qualitative and semantic aspects of spaces have been established since the middle of the 1970s, and their intangible components have also been taken into consideration. Such a shift in mindset has also had an impact on the debate surrounding the conservation of architectural heritage, leading researchers and experts to view conservation as a process addressing the semantic components of the architectural heritage as well as an effort to optimize and preserve the physical aspects of the buildings. Conservation is typically divided into two categories: preservation of the physical aspects and preservation of the conceptual aspects [16].

The “profession and knowledge of the restoration” refers to a set of measures that focus on enhancing the tangible conditions, whether through a direct intervention that modifies the physics and materials or indirect intervention that modifies the surroundings or modifies the influential factors of the historic building [17]. According to the 1999 Burra Charter, conservation is a set of measures enabling a person to achieve the values, meanings, messages, and concepts latent in heritage spaces [18].

2. Cultural Heritage and Identity

As a way to establish distinction and local identity in a globally competitive economy, the issue of cultural identity in contemporary architecture has gained importance in recent years [19]. The definition of culture is and always has been a hotly debated subject. Sociologists have been hard at work recently defining the differences between culture—the unmanageable, reckless creative genius—and civilization—the organized, reliable, frequently sophisticated mediocrity. Whatever their origin, historians have tended to emphasize the underlying interconnection of culture and civilization rather than dividing them. According to anthropologists and biologists, culture is simply the collection of characteristics that set one group apart from another. There are two possibilities: either diverse cultures engage in a fierce rivalry with one another, or distinct cultures experience an evolutionary development spiral in which features and creative impulses are easily exchanged. There would be an accumulation of fresh information as a result.

Identity is described as “the fact of being who or what a person or thing is; the traits that determine who or what a person or thing is” in the Oxford English Living Dictionary [20]. Contention surrounds the idea of identity as

well. People (society, community), place (region, geography, topography, and climate), and culture are all natural and human factors that go into the creation of “identity” (traditions, customs, language, religion, and artifacts). It is crucial to discuss these elements, their interactions, and how design responds to them [19]. Another extremely straightforward definition states that an individual's identity is what gives them purpose and meaning in life. Understanding culture and identity are interwoven if the goal of culture is to produce meaning via experience. However, culture is not always the consequence of conscious action. It might also be the result of unintentional actions where the actions are part of a larger promotion of cultural innovation. Calhoun, defined identity in the following way—“We know of no people without names and languages as well as cultural traits”—without being meaningful constructions even though it may feel like a discovery.

The propensity to think of people as having identities that are shaped by their cultures rather than the results of their achievements has gotten significantly stronger in recent years. The propensity to think of people as having identities that are shaped by their cultures rather than the results of their achievements has gotten significantly stronger in recent years. Since culture is related to the people who produced it, it is one of the most crucial factors in defining identity [19]. Identity naturalization itself reduces freedom of choice and autonomy. The narrative of group rights is a component of a larger cultural trend that maintains that ethnicity and culture determine people's consciousness and identity. By attributing individual awareness to the operation of culture, this trend presents an explanation devoid of human action. Individual views and acts are tolerated more than the identity of people because of collective adherence.

As a result, the “essence” of architecture is described as follows: Thus, the fundamental act of architecture is to comprehend the “vocation” of the site [21]. One of the many components of identity, architectural heritage in particular is a product of people, place, and culture. There is a connection between architectural symbolism and how societal and personal identity manifests. As a result of this accretion, “architecture as identity” has come to be equated with “architecture as space” and “architecture as a language” [22]. Architecture has the greatest capacity to incorporate and respond to the uniqueness of a place because it is the most obvious physical manifestation of every culture [23].

3. Values, Valorization, and Cultural Significance

The numerous conservation domains are interconnected by values and

valuing processes, which are crucial to the field's integration [24]. Whether they are architectural structures, works of art, or ethnographic objects, the byproducts of material culture have various connotations and applications for various people and groups. Values confer significance on some things over others, turning some things and locations becoming 'legacies'. Physical intervention or treatment is just one of many strategies used to achieve conservation's ultimate goal, which is to sustain (and shape) the values represented by the legacy, not to preserve the material for its own sake. It is vital to look at why and how heritage is valued, as well as by whom, to reach that goal and ensure that the heritage is valuable to the people it is intended to benefit (i.e., future generations).

But this valuation process doesn't start until the thing is already considered "legacy"; it's neither solitary nor objective. Through designation, societally generated or inherited culture (both aesthetic and pragmatic) is designated and acknowledged as heritage [25]. The way that people remember, arrange, reflect upon, and wish to use the past, as well as how material culture serves as a medium through which to do so, all contribute to the creation of cultural heritage. The narratives attached to, structures, and environments by individuals or groups serve as a medium of exchange for the valuation of cultural heritage. The process of valorizing starts when people, organizations, or communities determine that a certain artefact or location is valuable, represents something worth remembering and should be passed forward to future generations. These people or communities (whether political, scholarly, or other) intentionally produce a legacy by giving an item to a museum or by designating or listing a structure or place. But the process of generating and appreciating heritage has only begun [25].

The word "cultural significance" has been used by the conservation community to describe the many values attached to certain items, structures, or landscapes. The conservation community (defined broadly) strives to deal with the numerous emotions, meanings, and functions associated with the material things under its care through the classification of values of different disciplines, sectors of knowledge, or purposes. Decisions regarding the best way to preserve these values in the physical conservation of the object or place are based on the identification and ordering of values. Even though the typologies of many academic fields and disciplines differ, they all reflect a reductionist method of looking at the extremely complicated subject of cultural relevance.

Many diverse factors (economic, political, cultural, spiritual, artistic, and others) influence how heritage is valued, and each of these factors has its own set of principles, ethics, and epistemologies. The act of conservation (broadly defined) is typically seen as the technical response to the act of

heritage designation, i.e. after a location or thing has already been acknowledged as having worth. The fundamental assumption has been that preservation treatments shouldn't and wouldn't alter an object's meaning, yet the conventional practice of conserving—that is, preserving an object's physical fabric—actively interprets and values the object. Every decision about conservation, including how to clean an item, how to strengthen a building, what materials to use, and when, has an impact on how that item or location will be viewed, understood, and used in the future and, therefore, be passed on. Even if minimal intervention, reversibility, and authenticity are posited principles, choosing to carry out a particular conservation intervention prioritizes a certain meaning or set of values. The management of an archaeological site, for instance, may decide to stabilize one structure while excavating through another to reveal an earlier structure below.

4. Conservation Perspective

Integrating and contextualizing the spheres and activities of conservation, not only as a self-contained scientific or technological endeavor but as a social practice, has enormous pedagogical and practical potential. Since civilizations are always shifting on all scales, from the local to the global, conservation practices also change throughout time. Greater expectations are placed on heritage preservation as a check against unwelcome change and even as a way of enacting change as social and cultural change accelerates. One of the foundational elements of culture, art, and creativity is heritage. In any case, the cultural environment requires that both the stakes and the pressure to conserve rise sharply. Our current situation is as follows. Cultural legacy has always been taken for granted, along with its very existence and social role. Tradition dictates that civilizations preserve their older artefacts, and the reasons for this are generally understood and appreciated. They included concepts like “masterpieces,” “intrinsic merit,” and “authenticity.” These norms established what items were considered to be heritage and they were highly consistent. However, in the most recent generation, openly divisive and combative cultural politics have taken the role of cultural agreement and norms. The finest research on conservation and society provides convincing proof that the contrary of what was traditionally believed to be true is true: heritage is fundamentally politicized and contentious, and as a result, conservation cannot hide behind its traditional philosophical questions of faith [\[25\]](#).

The act of conservation repeatedly recreates its result (cultural heritage), amassing the traces of previous generations [\[25\]](#). As such, it must be

placed in its broader social contexts—as a component of the larger cultural sphere, as a fundamental aspect of public discourse, and as a social activity that is constantly being reshaped by forces like globalization, technological advancements, the expanding influence of market ideology, cultural fusion, and a variety of other factors. The future significance of our field rests on this process-centered conservation approach. It could serve as a foundation for practice orientation, policy formulation and analysis, comprehension of economic factors, and generally ensuring that conservation is “important” for society as a whole.

4.1. Making of Cultural Heritage

The phrase “legacy,” which is a legal term, can be defined as including anything that can be passed down from one generation to the subsequent generations and to which the descendants of the original owner or owners have rights that are regarded as deserving of respect. Landscapes, buildings, and objects are entities that the law recognizes as property and, as a result, as being capable of transmission across generations, which is one of the reasons they loom large in the management of legacy on a practical basis. The fundamental concept of heritage is expanded upon by the concept of “cultural” heritage. In this context, the concept of heredity is broadened to include ideological components that, like physical transmissions, allow the inheritors to assume their proper state and to be who they truly are.

The legal distinction between property (defined as material possessions and real land) and ideology (i.e., thoughts and sentiments) is an unjust dichotomy that improperly divides the seamless fabric of culture. Whether it be land, things, food, bodily use, or performance space, no social idea can exist without its physical embodiment. In turn, no physical manifestation can exist without ideological knowledge. Because of its physicality, cultural legacy may be directly challenged on the political stage, it can be owned, and no group can afford to conserve all of its heritage in the manner that it may desire [25]. Before going into the standards and values that experts use to determine whether an artifact qualifies as a piece of national heritage, I should briefly discuss the remarkable expansion of the corpus and some of its potential causes [24]. Heritage is the past's cultural authority as well as the deliberate development of a person's or an organization's identity.

4.2. Participatory Conservation Principle

The specialty literature and scientific practice based on laws, decrees, orders, and decisions in the field include the essential concepts that guide the regulations applied in the cultural heritage conservation process. Up until recently, the main principles adhered to in the general conservation process were authenticity, the importance of maintenance, minimal intervention, truth and honesty, reversibility, fitting the new to the old, legibility of interventions, and monitoring the conservation status through regular checks [26,27]. Today, an integrated scientific conservation method is the main focus (participatory conservation and stakeholder engagement). Several papers and studies in the field have put forth this strategy, and they have also suggested a particular set of interconnected principles to support it [26,28,29,30]. These additional principles must be highlighted to coordinate and reconcile various and frequently opposing interests as well as to facilitate open discussion in various contexts (social, cultural, economic, educational, and environmental) based on values, knowledge, skills, and community members' beliefs, while also upholding European and local rights (cultural, educational, and social). In a nutshell, the following principles (which are necessary for sound behavior and efficient participation) should be followed to make the transition from individual to structured engagement: Accessibility - equal rights and opportunities for informed engagement (access and participation) in the cultural life of the community; Mutual respect for history and cultural diversity (between individuals and between professionals and community members); Flexibility - the community engagements must be adapted to the context; and Transparent dialing are some of the factors that contribute to motivation. Give locals and community members more influence.

4.3. Cultural Heritage and Conservation

The term “culture” refers to all elements that embody all material and spiritual qualities produced through historical and social development. It includes every element used to communicate to the next generation the degree to which man's natural and social environment is sovereign. Culture is passed down from one generation to the next. This transfer is necessary for sustaining and protecting cultures [31]. The transmission of culture from one generation to the next is referred to as heritage, and it is significant in people's lives because of the numerous ways that ideas and objects are turned into symbols. This phenomenon is referred to as “culture.” Cultural heritage is a reflection of people's traditions, values, and knowledge as they have evolved to the present. All assets, both tangible and intangible, are included in cultural heritage. All of the environmental characteristics that result from people and places interacting over time make up cultural

heritage.

The architectural legacy is a cultural asset that belongs to all people and must be passed down to future generations while retaining its distinctive characteristics. Cultural heritage as a notion has evolved in terms of definition and breadth, becoming what it is now. Only significant monumental constructions can be considered cultural heritage in the early stages of the conception of conservation. The range of cultural heritage has expanded to include intangible works from various fields of culture and art [32]. Historical milestones had a crucial role in the expansion of the idea of cultural heritage. Both of these cultural legacies were significant during the French Revolution of the 18th century, a time when strategies for preservation and restoration were discussed and implemented. It is claimed that historical, documentary, aesthetic, artistic, social, economic, and spiritual values are all included in tangible and intangible cultural heritage. One of the most significant aspects of cultural legacy is architectural heritage. Without altering the originality and attributes that make up identity, aesthetic and cultural values must be revealed [33].

Tangible and intangible cultural legacy are the two basic categories that can be used to discuss cultural heritage. Generally speaking, tangible cultural heritage includes monuments, places, and mobile items [34]. Language, tradition, custom, music, dance, and other aspects of intangible cultural heritage are not readily apparent to the naked eye. However, there are connections between the ideas of tangible and intangible cultural property. The social, cultural, and historical legacy values are intertwined with society [35]. The World Cultural and Natural Heritage Agreement define conservation as the understanding and protection of cultural heritage, which consists of monuments, places, natural, geological, and physiographical formations, and every technique for restoring and presenting [34]. However, intangible values play a significant role in shaping the very character of the cultural legacy. The general understanding and goals of sustainability and conservation are identical.

The idea of sustainable development does involve limits—not absolute limits, but restrictions placed on environmental resources by the current state of technology and social organization as well as by the biosphere's capacity to absorb the impacts of human activity [36]. The goal in this situation is to safeguard cultural and ecological values. Architecture and aesthetics are destroyed along with cultural and historical values when this cultural heritage is destroyed. The general understanding and goals of sustainability and conservation are identical. Meeting current needs without sacrificing the capacity of future generations to meet their own needs is the definition of sustainable development. Within this context, it aims to safeguard both cultural and natural values.

4.4. Cultural Heritage and Globalization

Amidst the deluge of sights and images provided by an interactive world, our understanding of cultural heritage is shifting today. Our perception, which is still rooted in history and genealogy, must now be recast in the context of the new global cultural commons, in which the traditional web of meanings provided by various cultures is being rewoven. Many people are turning to cultural heritage, or the intersection of culture and history, to make sense of what is going on. When one thought of cultural heritage, one automatically thought of works of art, historical locations, and archaeological digs. However, the values that individuals associate with such actual items and locations give them meaning [25]. A brand-new global cultural commons is emerging. It is by definition multicultural, its relationships are uneven, and it resembles the terra incognita of old maps. The idea of cultural heritage is becoming more inclusive of cultural landscapes, popular cultures, and oral traditions. More and more can be seen in the web of meanings that coalesce into recognition in a particular time and place. The value placed on cultural heritage will therefore rely, if we adopt the aforementioned viewpoint, on the meanings that are ultimately selected from those continually moving along a network of cultural exchanges and recombination. Trade globalization, migration, and tourism, along with telecommunications and telematics, are currently adding more interactions to that web than ever before. Greater innovation may result from increased interaction and interchange, but the politics of difference also result in the protection of certain cultures [25].

The nation-states and cultural groupings are currently realigning themselves within the framework of globalization within the common cultural spaces. New techniques for safeguarding cultural heritage may be developed by various cultural groups.

5. Heritage Tourism: A Strategy for Preservation and Conservation

Heritage is noteworthy in today's society. Numerous individuals consume various forms of history in cities, museums, and rural areas. Since it offers the chance to preserve both traditional culture and modern values, tourism and culture have been created all over the world as a way to rejuvenate dilapidated structures and open spaces for contemporary uses. Abandoned

structures and areas are constantly at risk of deterioration or redevelopment, and failing to recognize their importance results in a missed opportunity to strengthen a community's and a place's identity.

Heritage conservation, proper interpretation of resources, authentic tourist experiences, and stimulation of cultural resource income are only a few of the aims of cultural heritage tourism that must be addressed within the framework of sustainable development. Identification, administration, and conservation of legacy values are just some of the issues that are addressed in the development of cultural heritage tourism, along with its effects on local communities and regional economies, the provision of financial resources, marketing, and promotion [37]. It's also critical to consider how tourists' visits to indigenous people's lands and cultures may affect them.

For instance, the Varnhem archaeological project included both educational and scientific elements. Therefore, conducting excavations and making them available to the interested public so they could have a close-up look at historic and archaeological traces were equally significant endeavors. Ten years after the project's inception, public archaeology is now a well-established academic subfield with a wide range of publications and journals that explore and problematize the field's relationship with the general public. In Sweden, contract archaeology and museums have both been impacted by this phenomenon. All significant archaeological excavation projects now include public archaeology in one way or another, but when the Varnhem project began, there were few examples of how to engage the public [38]. An overview of the project's communication and public-facing activities is provided below.

Cultural heritage tourism depends on heritage preservation and protection because the sustainability of the offering depends on it. As a result, the main difficulty facing tourism programs is preventing increased tourism from destroying the same characteristics that draw tourists in the first place. Some tourism issues include an increase in visitors and further strain on infrastructure and historic places. Tourism programs depend on the skill of individuals in many positions and locations because it is a service sector. Because the tourism sector is a highly developed and dynamic one, it faces challenges from both visitor impact and visitor expectations for high-quality goods and services.

6. Architectural Preservation and Restoration: A Long-Term Perspective

Solutions for long-term archiving, indexing and retrieval of cultural material are covered in this research. Something can be preserved for a few years with relative ease, but it can be very difficult to keep something preserved for a few decades. Thus, the so-called quiet obsolescence of data formats, software, and hardware puts a great deal of digital data at risk [39,40]. This challenge has a variety of causes. In actuality, there aren't many worldwide standards. As was previously said, having access to the raw data is important for processing it using more advanced algorithms and methods. In this approach, as technology develops, the model's accuracy could be improved. The gathering, analysis, and configuration of this documentation and out-of-date content take a lot of time and resources [41]. In essence, archiving and indexing are the first two processes in the long-term preservation of a site, and retrieval is the final one. This cycle of procedures can be utilized to migrate data over time as technology advances [42].

Both system-level (such as software or scanner technology changes) and information model-level (such as data format or collecting techniques changes) modifications might result in these changes. It is preferable to store the models and the raw data in a central archive from the perspective of cultural heritage. A data warehouse is the best place to store archive data since it houses historical data that has been gathered over time [43]. It becomes crucial to index the sites and artefacts when using a data warehouse so that it is possible to get not only the site or artefact of interest but also any sites that might be connected to a particular site. The index or description may be text-based, based on numbers, or based on content.

7. Building Information Modeling (BIM) for Conservation

BIM is a 3D digital depiction of a building, structure, or environment that includes all of its unique qualities. It is made up of environment characteristics or intelligent building elements that include data properties and parametric rules for each object [44]. The HBIM plug-in is a collection of parametric objects made from old data. Additionally, it is a system for projecting survey picture data and parametric objects into a point cloud. The first step in the HBIM process is the remote collection of survey data utilizing digital photogrammetry modeling or terrestrial laser scanning.

Using Geometric Description Language, the issue of file format and data transmission has been resolved while creating parametric objects (GDL). The parametric objects can be shared and edited at many levels thanks to GDL's scripting [45]. The utilization of historical data creates the possibility

to develop detail about the object's processes of production and material composition underneath its surface. The libraries of parametric objects are mapped onto the point cloud and image survey data in the last stage of the HBIM process using a platform of cross-software administration. The HBIM can automatically generate 3D models and complete engineering orthographic drawings [46].

In the context of cultural heritage, there are numerous BIM applications, and this section highlights typical situations. One of these is the Italian city of L'Aquila's Basilica of St. Maria of Collemaggio, which was harmed by the 2009 earthquake. To support the ongoing design project of conservation and intervention of the damaged temple elements, a 3D detailed model was developed for this survey (Figure 2). The HBIM model controls the phases of structural behaviour simulation, analysis, project economic evaluation, and temple restoration [47]. The modeling of Ireland's Henrietta Street in Dublin is another BIM use. The procedure began with laser scanning, and the BIM platform ArchiCAD received the finished orthographic pictures. To preserve cultural heritage, laser scanning and photogrammetry may capture extremely high and precise levels of information on the spot. The modeling was then finished by merging all the necessary library components found in the HBIM plug-in. The last step is to convert the Henrietta Street HBIM model (Figure 3) into CityGML for additional GIS analysis. Google SketchUp with the CityGML plug-in was utilized for this. Last but not least, CityGML integration can offer further options for integrating information systems with 3D legacy models. For analysis and effective management that is necessary for sustaining significant heritage monuments, the CityGML model can be incorporated into GIS systems [48].

Figure 2. 3D ©Revit model of the Basilica St. Maria and WBS to manage the restoration

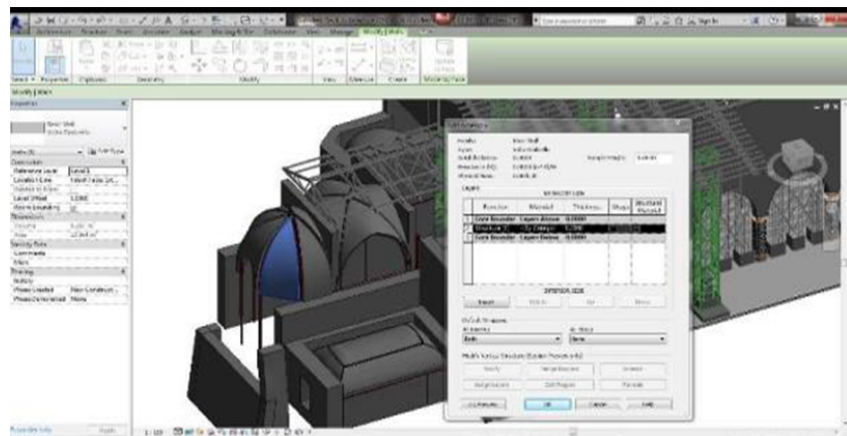
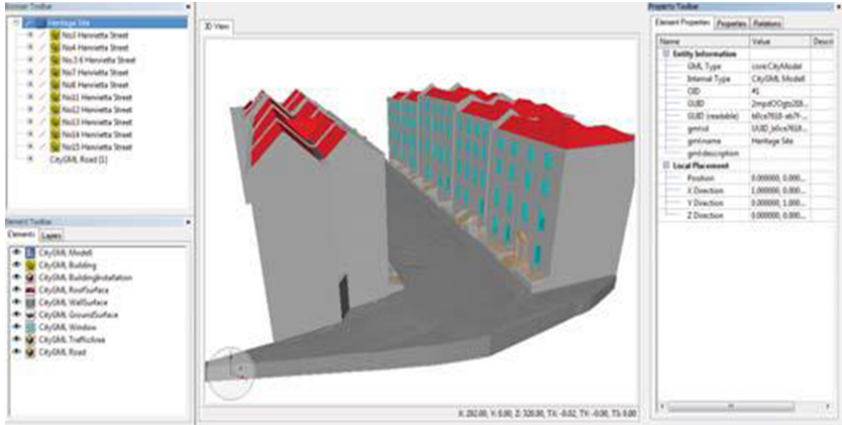


Figure 3. Final HBIM Model of the Henrietta Street



The benefits of creating heritage structures in a 3D BIM environment also include:

- Remote inspection of the interior and outside of the building.
- Enables research using novel structures in a context-specific setting.
- The ability to survey various periods.
- Utilizing photos to better estimate the structure, we can better grasp texture, massing, and form.
- Enables consideration of modifications and alterations before committing to a plan and completing the construction documentation.
- A 3D building is typically easier to comprehend than a 2D flat drawing [49].

8. Challenges for Heritage Conservation

The community has been using heritage conservation constantly, and it is essential to religious and cultural traditions. Numerous obstacles must be overcome by these cultural heritage preservation sites, and many of them have recently suffered irreparable harm. The problems and difficulties associated with preserving cultural heritage are caused by more than only the physical characteristics of the artifacts and sites themselves, but also by the roles they play in society. There are several variables that either directly or indirectly contribute to their decline, but among the most notable ones are widespread tourism and religious traditions. Interventions on historic

buildings and the abandonment of old buildings by local communities are further factors. The topography and temperature of the area are very well matched by traditional architecture. Global warming is a problem that is hurting every region's environment and cultural heritage.

Overall, there has been zero engagement between the community and the institutions and/or people involved with heritage. As a result, the community's worries and concerns have never been acknowledged or addressed appropriately. Because of this, the majority of conservation programs are fragmented and grow without adopting a consistent strategy for holistic growth and sustainable conservation.

9. Need for Sustainable Approaches in Architectural Conservation

In contrast to conventional practice that relied solely on empirical information, conservation has recently developed as a discipline that is based on methodologies [50]. Since the field's foundation, several conservation strategies have emerged, and their application has been the subject of ongoing discussion and disagreement. As it involves community stakeholders in conservation decisions and interventions—a more democratic process - a value-based approach that is built on the traditional material-based approach is thought to be more appropriate [51,52]. The value-based strategy is widely used and approved across the globe. Poullos, however, more recently put out a brand-new living cultural heritage approach that prioritizes the functions of the living heritage over its fabric and places an emphasis on the livingness, continuity, and regeneration of the heritage [53,54,55]. This region's cultural history is more than just an ongoing tradition; it also has long-standing archaeological, historical, and aesthetic worth. Therefore, it would be counterproductive to emphasize the heritage's function above its values and significance [56,57]. However, a well-balanced strategy that takes into account the heritage's archaeological, historic, aesthetic, and functional aspects may be able to guarantee the viability of conservation efforts and the unbroken continuation of customary ways of life. The goal of achieving sustainability is unattainable, and the current conservation interventions are patchy. Following that, it is possible to bring in architects, heritage specialists, conservators, and other professionals to carry out organized conservation interventions. The local communities must understand that their heritage is important to the entire world's history as well as to them personally. Over time, these activities will maintain local stakeholders' enthusiasm and the caliber of conservation interventions. The process is slower, less effective, and frequently results in

conflicts where the stakeholder and the conservator do not understand each other's priorities, leading to compromises that may ultimately be harmful to heritage resources when conservation agencies attempt to intervene and act as vanguards of heritage.

This is demonstrated by the large number of tourists who go to the area and appreciate it for its ancient structures and distinctive cultural traditions, which serve as markers of civilizational history. Therefore, conservation organizations and local populations should actively communicate about all conservation projects while also keeping in mind the region's significance for global history.

10. Conclusions

Work in architecture represents creativity, which combines art, culture, and technology. Cultural heritage preservation requires a multifaceted strategy. To maintain heritage architecture, it is necessary to maximize the rich potential of natural resources, cultural variety, and human resources via creativity and innovation. These traits are the characteristics of cultural capital and symbolic capital. For future generations to continue to benefit from the heritage and cultural value of earlier generations, it is now required that heritage architecture be preserved through restoration efforts. Restoration efforts are anticipated to enhance human welfare by promoting cultural heritage through local, national, and international tourism initiatives. The region's unchecked expansion and rampant tourism growth may appear to be signals of progress.

Religious buildings serve as functional components of customary activities and as such, should be at the center of any conservation effort. Future generations can always expect indigenous peoples and the government to protect and maintain historic structures to ensure their continued cultural heritage sustainability. To establish checks and balances in civic development and tourism-related concerns, the government and local administrative bodies will need to assume the duty of making policy decisions. Programs for education and awareness, and lively discussions amongst stakeholders, decision-makers, and conservation specialists can all play significant roles.

To document cultural heritage, architects, conservators, and archaeologists must also try to use BIM. BIM technology's richness and complexity are seen in a wide range of industries, including environment, architecture, construction, monuments, and structural framework. The possibility for many more exists in the BIM field. There is still a tonne of room for growth

and improvement. Finally, it is still possible to maintain traditional architecture with proactive measures and the development of appropriate acts for cultural heritage conservation to achieve the ideal balance between antiquated value systems and contemporary developmental strategies so that cultural heritage—both tangible and intangible is protected and preserved.

References

- [1] Law Number 11 of 2010 concerning Cultural Heritage, 2010.
- [2] I. D. G. A. D. Putra, N. K. A. Dwijendra, S. A. Paturusi, and I. M. A. Mahendra, *Elements of the Cultural Space as a Form Identity of Klungkung Urban Area, Bali, Indonesia*, Journal of Social and Political Sciences, 2019.
- [3] I. G. N. A. Rajendra, N. K. A. Dwijendra, P. R. Salain, and A. Kurniawan, *The Effect of Dutch Colonial Architecture on Palace in Bali, Indonesia*, Journal of Social and Political Sciences, 2019.
- [4] A. Kurniawan, P. R. Salain, N. K. A. Dwijendra, and I. G. N. A. Rajendra, *Revealing the meaning behind Mandala of Agung Karangasem Palace, Bali Indonesia: Investigating through semiotics for the preservation of historic value*, International Journal of Advanced Science and Technology, vol. 29, no. 7, 2020.
- [5] Frysa Wiriantari, Ngakan Ketut Acwin Dwijendra, Desak Made

Sukma Widiyani, Anak Agung Ayu Sri Ratih Yulianasari, Arya Bagus Mahadwijati Wijaatmaja, *Transformation of Catuspatha (Crossroad) In Bali Indonesia: Alteration Ideas From Empty Space To Aesthetic Element Of City*, Solid State Technology, Vol 63, Issue 6, 2000.

- [6] N. K. A. Dwijendra, S. A. Paturusi, and W. Widiastuti, *Cultural Value Transformation in Traditional Market Spatial Planning in City of Denpasar, Gianyar and Klungkung – Bali, Indonesia*, Journal of Sustainable Development, 2017.
- [7] Kurniawan H, Salim A, Suhartanto H, Hasibuan ZA. *E-cultural heritage and natural history framework: an integrated approach to digital preservation*, International Conference on Telecommunication Technology and Applications (IACSIT) 2011 pp. 177-182.
- [8] Dr. B. Shankar, Dr. Chidambara Swamy, *Creating Awareness for Heritage Conservation in the City of Mysore: Issues and Policies*, International Journal of Modern Engineering Research, Vol 3, Issue 2, March-April 2013, pp – 698-703.
- [9] Saygi, G., Remondino, F., *Management of Architectural Heritage Information in BIM and GIS: State of the art and Future Perspectives*, Int. Journal of Heritage in the Digital Era, Vol.2

(4), page. 695-714, 2013.

- [10] IGI Global, *What is Architectural Heritage, Publisher of Timely Knowledge*, Available <https://www.igi-global.com/dictionary/architectural-heritage/48665>.
- [11] COUNCIL OE. *Convention for the protection of the Architectural heritage of Europe*, Granada. 1985; 3: 1985.
- [12] Taylor J, Cassar M. *Representation and intervention: the symbiotic relationship of conservation and value*, Stud Conserv. 2008; 53 (sup1): 7-11.
- [13] Petzet M. *Principles of preservation: an introduction to the international charters for conservation and restoration 40 years after the Venice charter*, Available: http://openarchive.icomos.org/432/1/Monuments_and_Sites_1_Charters_Petzet.pdf.
- [14] Jokilehto J. *History of architectural conservation*. Routledge; 2007. Available: https://www.iccrom.org/sites/default/files/ICCROM_05_HistoryofConservation00_en_0.pdf.
- [15] Stubbs JH. *Time-honored: A global view of architectural conservation*. John Wiley; 2009. Available: <https://www.wiley.com/en-us/Time+Honored%3A+A+Global+View+of+Architectural+Conservation-p-9780470260494>.

- [16] Del MS, Tabrizi SK. A *methodological assessment of the importance of physical values in architectural conservation using the Shannon entropy method*. J Cultural Herit. 2020.
- [17] Feilden B. *Conservation of historic buildings*, Routledge. 2007.
- [18] ICOMOS A. *The Burra Charter: the Australia ICOMOS charter for places of cultural significance*, Burwood: Australia ICOMOS. 1999. Available: <https://australia.icomos.org/wp-content/uploads/BURRACHARTER.pdf>.
- [19] Osama Nasir, and Mohammad Arif Kamal, *Vernacular Architecture as a Design Paradigm for Sustainability and Identity: The Case of Ladakh, India*, American Journal of Civil Engineering and Architecture, vol. 9, no. 6, 2021: pp 219-231.
- [20] Oxford dictionaries, *Identity Meaning*. Retrieved from oxford dictionaries, 2017 [Online]. Available: <https://en.oxforddictionaries.com/definition/us/identity/identity>.
- [21] Jina, P. S., *Ladakh, the Land and the People*, Indus Publishing Company, Srinagar, 1996.
- [22] McLennan J. F., *The Philosophy of Sustainable Design*, MO EcoTone, Kansas City, 2006. 6, 10, 52, 53.

- [23] Curl JS, *A Dictionary of Architecture and Landscape Architecture*, Oxford University Press, Oxford, 2006.
- [24] Nathalie Heinrich, *The Making of Cultural Heritage*, Nordic Journal of Aesthetics, June 2011.
- [25] Erica Avrami, Randall Mason, Marta de la Torre, *Values and Heritage Conservation*, the Getty Conservation Institute, Los Angeles, 2000.
- [26] E.C.C.O., *Draft of European Recommendation for the Conservation and Restoration of Cultural Heritage*. Bruxelles, 2008.
- [27] Worthing, D.; Bond, S. *Managing Built Heritage. The role of cultural significance*, Blackwell Publishing, Cambridge 2008.
- [28] Shah, D.; Schmierbach, M.; Hawkins, J.; Espino, r.; Donovan, J., *Nonrecursive models of internet use and community engagement: questioning whether time spent online erodes social capital*, J&MC Quarterly, 79 (4), 964-987, 2002.
- [29] Bass, S.; Dalal-Clayton, B., Pretty, J. *Participation in strategies for sustainable development. Environmental Planning Issues*, International Institute for Environment and Development. London, United Kingdom, 118 p, 7 May 1995.

- [30] Waterton, E.; Watson, E. *Heritage and Community Engagement: finding a new agenda*. In Waterton, E.; Watson, S. (eds.). *Heritage and Community Engagement: Collaboration or Contestation?* (pp. 1-12) Routledge Chapman & Hall 2011.
- [31] Ozlem Atalan, *Importance of cultural heritage and conservation concept in the "architectural education"*, International Journal of Human Sciences, Volume 15, Issue 3, 2018.
- [32] Korumaz, A., *Kültürel miras yönetiminde karar destek sistemlerinin kullanımına yönelik bir model önerisi / A decision support model proposal for use in cultural heritage management*, Selçuk Üniversitesi, Fen Bilimleri Enstitüsü, Mimarlık Anabilim Dalı, Basılmamış doktora tezi, Konya. 2016.
- [33] Icomos *Türkiye Mimari Mirası Koruma Bildirgesi*, 26 June 2017. Available: http://www.icomos.org.tr/Dosyalar/ICOMOSTR_0623153001387886624.pdf.
- [34] UNESCO, *World Heritage Convention*, Available: <https://whc.unesco.org/en/conventiontext/>.
- [35] Zancheti S.M., Ferreira Hidaka L.T., Ribeiro C., Aguiar B., *Judgement and Validation in The Burra Charter Process: Introducing Feedback in Assessing the Cultural*

Significance of Heritage Sites,
City & Time, 4 (2), 2009.

- [36] Bruthland Report, *Report of the World Commission on Environment and Development: Our Common Future*, 1987,
Available: <http://www.un-documents.net/our-common-future.pdf>.
- [37] Fladmark, J.M., Habgood, J.
Cultural Tourism, Papers
Presented at the Robert Gordon
University Heritage Convention,
Donhead Publishing, London,
1994.
- [38] Axelsson, T. *Systematisk
destruktion – värde, förlust och
compensation*, In: Grahn
Danielson, B., Rönn, M. &
Swedberg, S. (eds.)
Kompensationsåtgärder vid
exploatering i kultur- och
naturmiljöer Fjällbacka:
Kulturlandskapet 2015.
- [39] Ronchi, A.M., *From Hammurabi
Codex to Rosetta Stone: Long-
term Preservation of Digital
Archives*, Medici Framework
Panel, World Wide Web
Conference, New York, pp.1-15,
2004.
- [40] Heminger, A.R. and Robertson,
S.B. *The Digital Rosetta Stone: A
Model for Maintaining Long Term
Access to Static Digital
Documents*, *Communications of
the Association for Information
Systems*, 3 (2), 2000.

- [41] Rodig, P. et al., *Preservation of Digital Publications: An OAIS Extension and Implementation*, Proceedings of the 2003 ACM Symposium on Document Engineering, Grenoble: France, pp. 131-139, 2003.
- [42] Rajasekar, A. et al., *Collection-based Persistent Archives*, Proceedings of the 16th IEEE Symposium on Mass Storage, March 1999.
- [43] Kimball, R. and Ross, M., *The Data Warehouse Toolkit: Dimensional Modeling*, 2nd Edition, John Wiley and Sons, Canada, 2002.
- [44] Hergunsel, M. F., *Benefits of Building Information Modeling for Construction Managers and BIM-based scheduling*, Worcester Polytechnic Institute, 2011.
- [45] Murphy, M., Dore, C., *Integration of Historic Building Information Modelling (HBIM) and 3D GIS for Recording and Managing Cultural Heritage Sites*, 18th International Conference on Virtual Systems and Multimedia (VSMM): "Virtual Systems in the Information Society", Milan, Italy, pp. 369-376, 2-5 September 2012.
- [46] Murphy M., McGovern E. & Pavia, S. *Historic Building Information Modelling - Adding Intelligence to Laser and Image-Based Surveys*, 4th ISPRS International Workshop, 3D ARCH 2011: "3D Virtual Reconstruction and

Visualization of Complex Architectures" Trento, Italy, 2-4 March 2011.

- [47] Oreni D., Brumana R., Della Torre S., Banfi F., Barazzetti L., Previtali M., *Survey turned into HBIM: the restoration and the work involved concerning the Basilica di Collemaggio after the earthquake (L'Aquila)*, ISPRS Technical Commission V Symposium, 23-25 June 2014, Italy.
- [48] Dore, C., Murphy, M., *Integration of Historic Building Information Modeling and 3D GIS for Recording and Managing Cultural Heritage Sites*, 18th International Conference on Virtual Systems and Multimedia: "Virtual Systems in the Information Society", Milan, Italy, pp. 369-376, 2-5 September 2012.
- [49] Maddigan, J. *HCF National Heritage Summit*, Canadian Association of Heritage Professionals, 2012.
- [50] Phillipot, P. *Restoration from the perspective of humanities*, In *Historical and Philosophical Issues in the Conservation of Cultural Heritage*, ed. N. S. Price, M. K. Talley, and A. M. Vaccaro. Los Angeles: Getty Publications. 216-229, 1996.
- [51] de la Torre, M., ed., *Assessing the Values of Cultural Heritage: Research Report*. : The Getty Conservation Institute, Los

Angeles, CA, 2002, Available:
[http://hdl.handle.net/10020/
gci_pubs/values_cultural
heritage](http://hdl.handle.net/10020/gci_pubs/values_cultural_heritage).

- [52] Wijesuriya, G. *Values of the heritage in the religious and cultural traditions of Southern Asia*. Values and Criteria in Heritage Conservation, Proceedings of the International Conference Proceedings of the International Conference of ICOMOS, ICCROM, Fondazione Romualdo Del Bianco, Florence, Italy. 73–78, March 2-4, 2007.
- [53] Poullos, I. *Moving beyond a values-based approach to heritage conservation*, Conservation and Management of Archaeological Sites 12 (2): 170-185, 2010.
- [54] Poullos, I. *Conserving living religious heritage: Maintaining continuity and embracing change — The Hindu temples of Tanjore, Srirangam and Tirupati in India*. South Asian Arts, 2010. Available: [http://
www.southasianarts.org/2010/10/
conserving-livingreligious-
heritage_15.html](http://www.southasianarts.org/2010/10/conserving-livingreligious-heritage_15.html).
- [55] Poullos, I. *The past in the present: A living heritage approach— Meteora, Greece*, Ubiquity Press, London, 2010.
- [56] Kamal Arif M., Brar T. S., Analysis of Seismic Retrofitting in Heritage Buildings: Techniques and Conservation Interventions,

Journal Architecture Engineering Science, Volume 2, Issue 3, pp 73-83, Frontier Scientific Publishing, Singapore, 2021.

[57]

Rathore N., Maheshwari S., Kamal Arif M., Evaluating the Value of Heritage Buildings: The Case of Rajasthan, India', Vol. 9, No. 3, pp. 95-102, *American Journal of Civil Engineering and Architecture*, U.S.A., 2021.